daitsu

Service Manual

Multi Split Type
Heat Pump Air Conditioners

Applied to: DS-9U2M_DOS-18U2M
DS-9U11M_DS-12U11M_DOS-21U11M

Content

Multi SERIES

1. Features
2. Specification
3. Dimensions
4. Refrigeration cycle diagram
5. Operation limits
6. Wiring diagram
7. Troubleshooting
8. Electronic function
9. Exploded view parts
10. Characteristic of temp. sensor

1.Features

1.1 Compact design

1.2 High efficiency and quiet operation

1.3 Universal outdoor unit and indoor unit design

2 Specifications

2.1 Indoor unit

Glory multi indoor unit

Model			DS-9U2M_DOS-18U2M	DS-9U11M_DS-12U11M_DOS-21U11M
Power supply		Ph-V-Hz	1Ph,220-240V~,50Hz	1Ph,220-240V~,50Hz
Indoor fan motor	Model		RPG13H	RPG13H
	Brand		Welling	Welling
	Input	W	36.5	36.5
	Capacitor	uF	1.2μF/450V	1.2μF/450V
	Speed(hi/mi/lo)	r/min	1180/1080/1000	1250/1100/950
Indoor coil	a.Number of rows		2	2
	b.Tube pitch(a)x row pitch(b)	mm	21X13.37	21X13.37
	c.Fin spacing	mm	1.3	1.3
	d.Fin type (code)		Hydrophilic aluminum	Hydrophilic aluminum
	e.Tube outside dia.and type	mm	Φ7, Inner groove tube	Φ7, Inner groove tube
	f.Coil length x height x width	mm	578X252X26.74	578X252X26.74
	g.Number of circuits		2	2
Indoor air flow (Hi/Mi/Lo)		m3/h	510/460/410	660/580/500
Indoor noise level (Hi/Mi/Lo)		dB(A)	36/34/32	39/33/28
Indoor unit	Dimension (W*H*D)	mm	750×250×188	815×280×195
	Packing (W*H*D)	mm	830X336X280	915X360X275
	Net/Gross weight	Kg	8.5/10.5	10.5/13.5

2.2 Outdoor unit

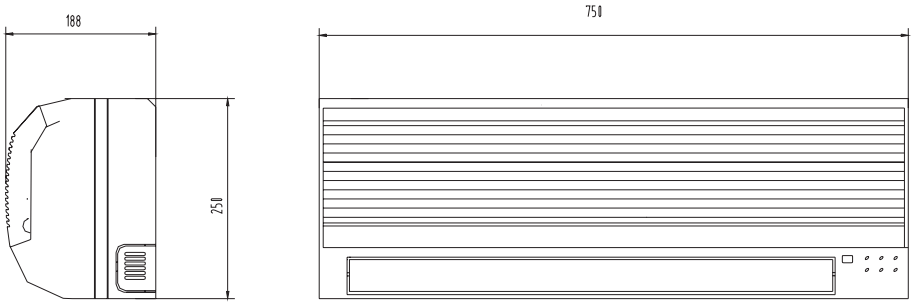
Model			DS-9U2M_DOS-18U2M	DS-9U11M_DS-12U11M_DOS-21U11M
Power supply		Ph-V-Hz	1Ph,220-240V~,50Hz	1Ph,220-240V~,50Hz
Cooling	Capacity	Btu/h	18000	20000
	Input	W	1861	2150
	Rated current	A	8.3	9.5
	EER	Btu/w.h	9.7	9.3
Heating	Capacity	Btu/h	19000	21500
	Input	W	1900	2194
	Rated current	A	8.4	9.7
	COP	Btu/w.h	10.0	9.8
Moisture Removal		L/h	1.0x2 +1.2	1.0x2 +1.2
Max. input consumption		W	2160	2580
Max. current		A	9.9	11.7
Starting current		A	21.7	29.9
Compressor	Model		PA108X1C-4FTx2	PA108X1C-4FT; PA145X2C-4FT
	Type		Rotary	Rotary
	Brand		GD Toshiba	GD Toshiba
	Capacity	Btu/h	8874	8874/12014
	Input	W	890	890/1200
	Rated current(RLA)	A	4.07	4.07/5.6
	Locked rotor Amp(LRA)	A	40	40/57
	Thermal protector		Internal	Internal
	Capacitor	uF	25uF/440-450VACx2	25uF/440VAC; 35uF/440VAC

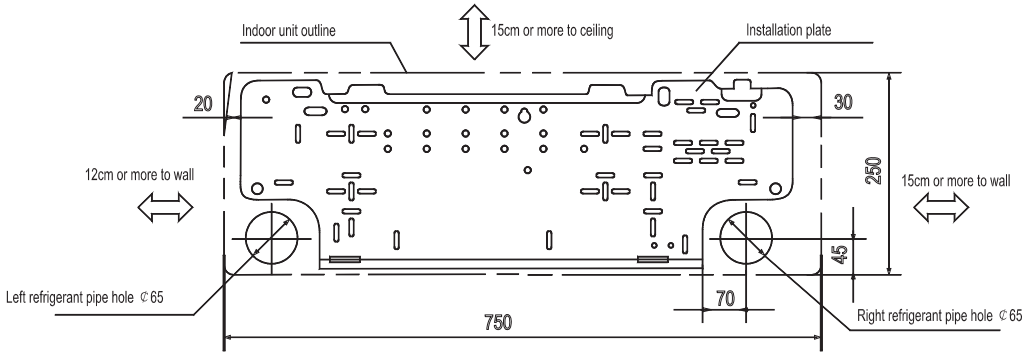
	Refrigerant oil	ml	350	350/480
Outdoor fan motor	Model		YDK60-6	YDK60-6
	Brand		Welling	Welling
	Input	W	122	122
	Capacitor	uF	4uFx2	4uFx2
	Speed	r/min	830/650	830/650
Outdoor coil	a.Number of rows		2	2
	b.Tube pitch(a)x row pitch(b)	mm	25.4x24	25.4x24
	c.Fin spacing	mm	1.7	1.7
	d.Fin type (code)		Hydrophilic aluminium	Hydrophilic aluminium
	e.Tube outside dia.and type	mm	Φ9.53, Innergroove tube	Φ9.53, Innergroove tube
	f.Coil length x height x width	mm	810X610X44	810X610X44
	g.Number of circuits		2/2	2/2
Outdoor air flow		m3/h	2200	2200
Outdoor noise level		dB(A)	56	56
Outdoor unit	Dimension(W*H*D)	mm	895X655X345	895X655X345
	Packing (W*H*D)	mm	1050X720X470	1050X720X470
	Net/Gross weight	Kg	75/81	76/82
Refrigerant type		g	R410A/ 980x2	R410A/ 1100+900
Design pressure(Hi/Lo)		MPa	4.2/2.5	4.2/2.5
Refrigerant piping	Liquid side/ Gas side	mm(inch)	Φ6.35/Φ9.53	Φ6.35/Φ9.53; Φ6.35/Φ12.7
	Max. refrigerant pipe length	m	10 (each unit)	10 (each unit)
	Max. difference in level	m	10 (each unit)	10 (each unit)
Connection wiring			No	No
Plug type			No	No
Thermostat type			Electronic control	Electronic control
Operation temp		℃	17~30	17~30
Ambient temp		℃	18~45(cooling); -7~30(heating)	18~45(cooling); -7~30(heating)
Application area		m2	(14-21)x2,16-24	(14-21)x2,16-24

3.Dimensions

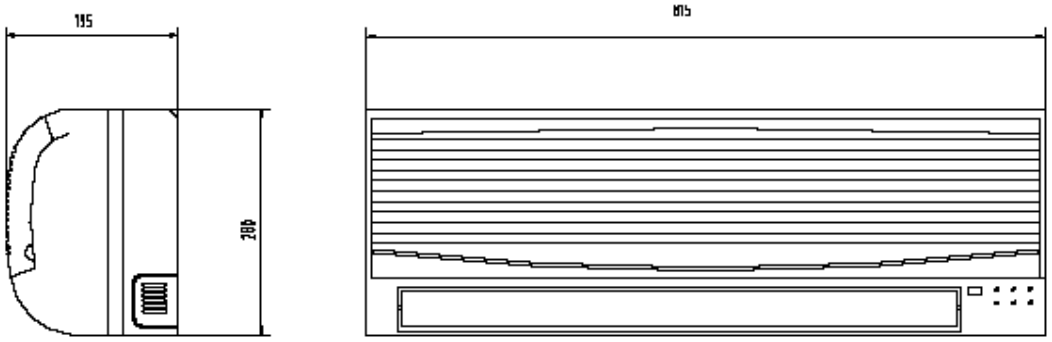
3.1 Indoor unit

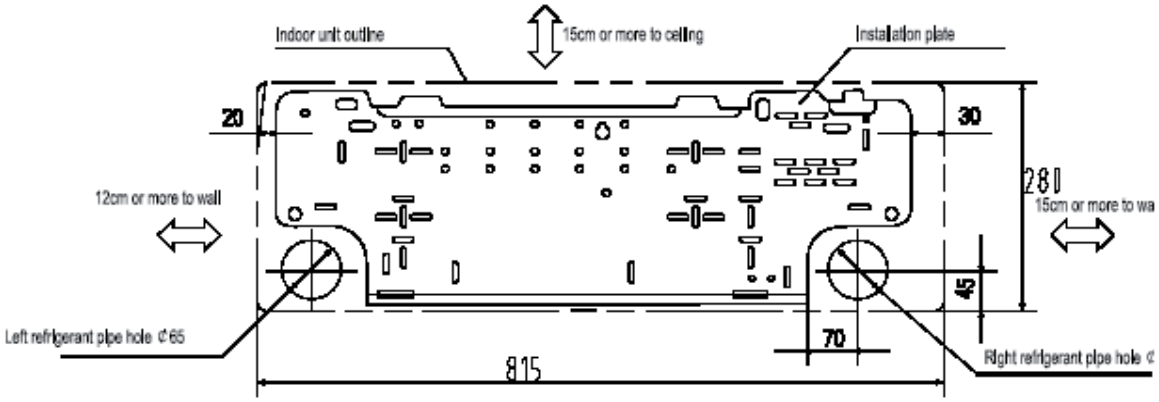
a) Indoor unit 9K





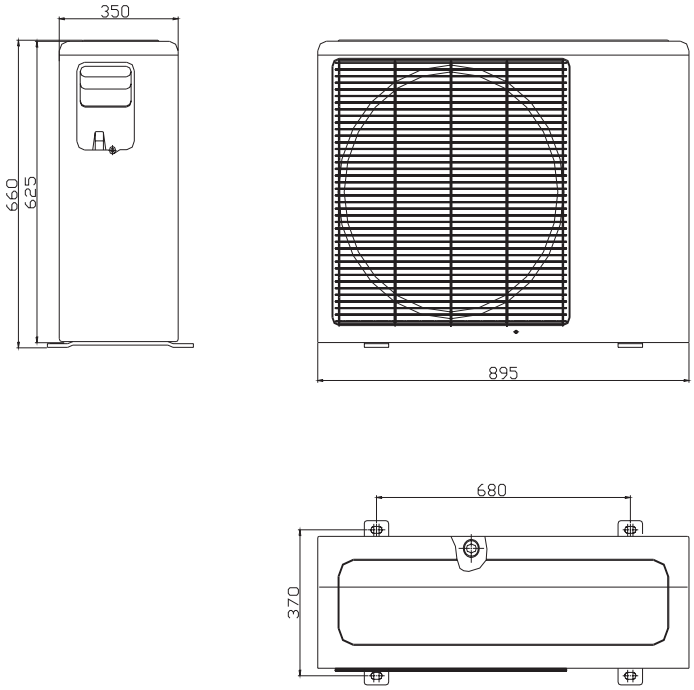
b) IndoorUnit12K





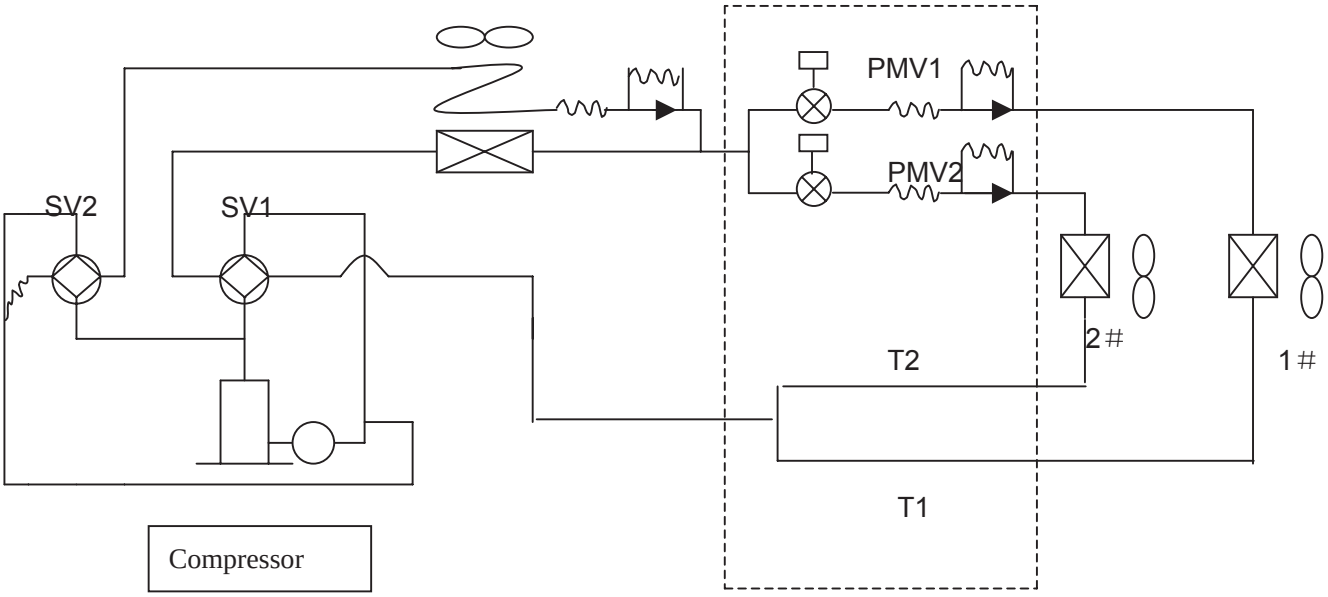
3.2 Outdoor unit

a) Outdoor unit 18K/21K



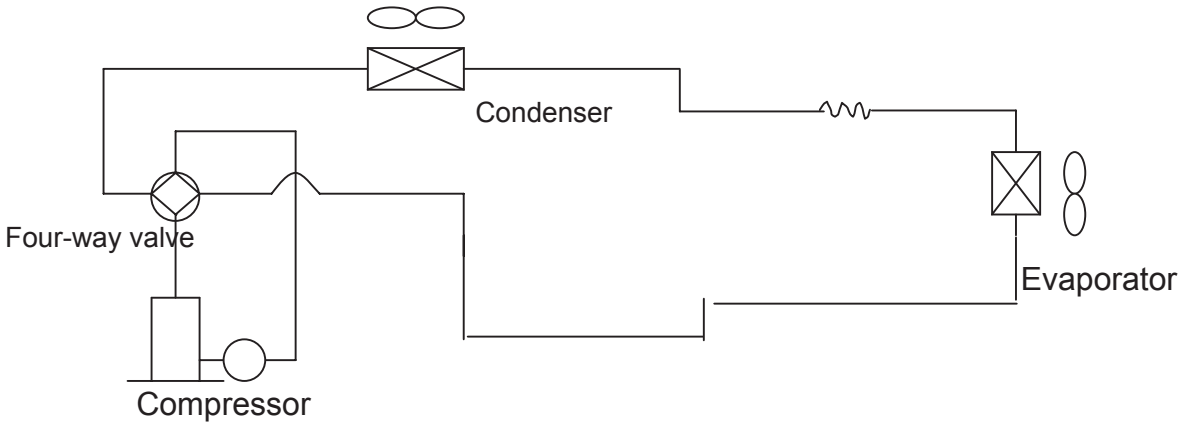
4.Refrigeration cycle diagram

"1 drive 3 system" is made up of one "1 drive 1 system" and one "1 drive 2 system".



1 drive 2 system

SV1：Primary four-way valve SV2：Secondary four-way valve PMV1，PMV2：Electronic expansive valve
T1，T2：Indoor pipe temperature sensor



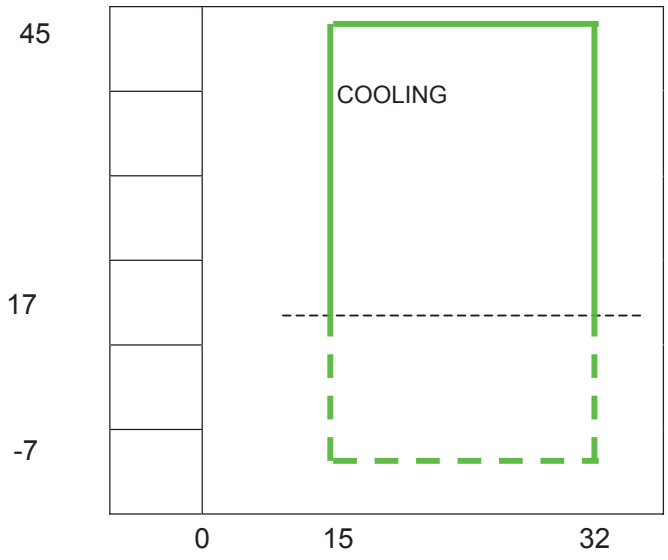
1 drive 1 system

Notice：For 1 drives 2 system, there are two individual refrigerant circuit and two compressors, but for the 1drive 2 system in the 1 drive three system, there is only one refrigerant circuit and only one compressor.

5.Operation limits

5.1Cooling operation

Outdoor unit air temp.℃ DB



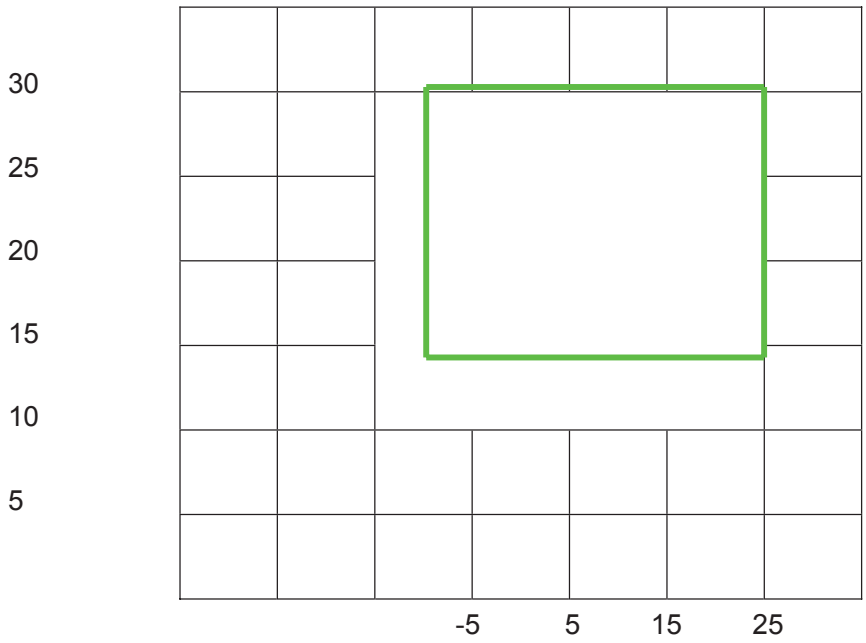
Indoor air temp. ℃ DB

Note: 1.The chart is the result from the continuous operation under constant air temperature Condition. However, excludes the initial pull-down stage.

2.The operation range below the dashed is the result added the low ambient kit.

5.2Heating operation

Indoor air temp. ℃ DB

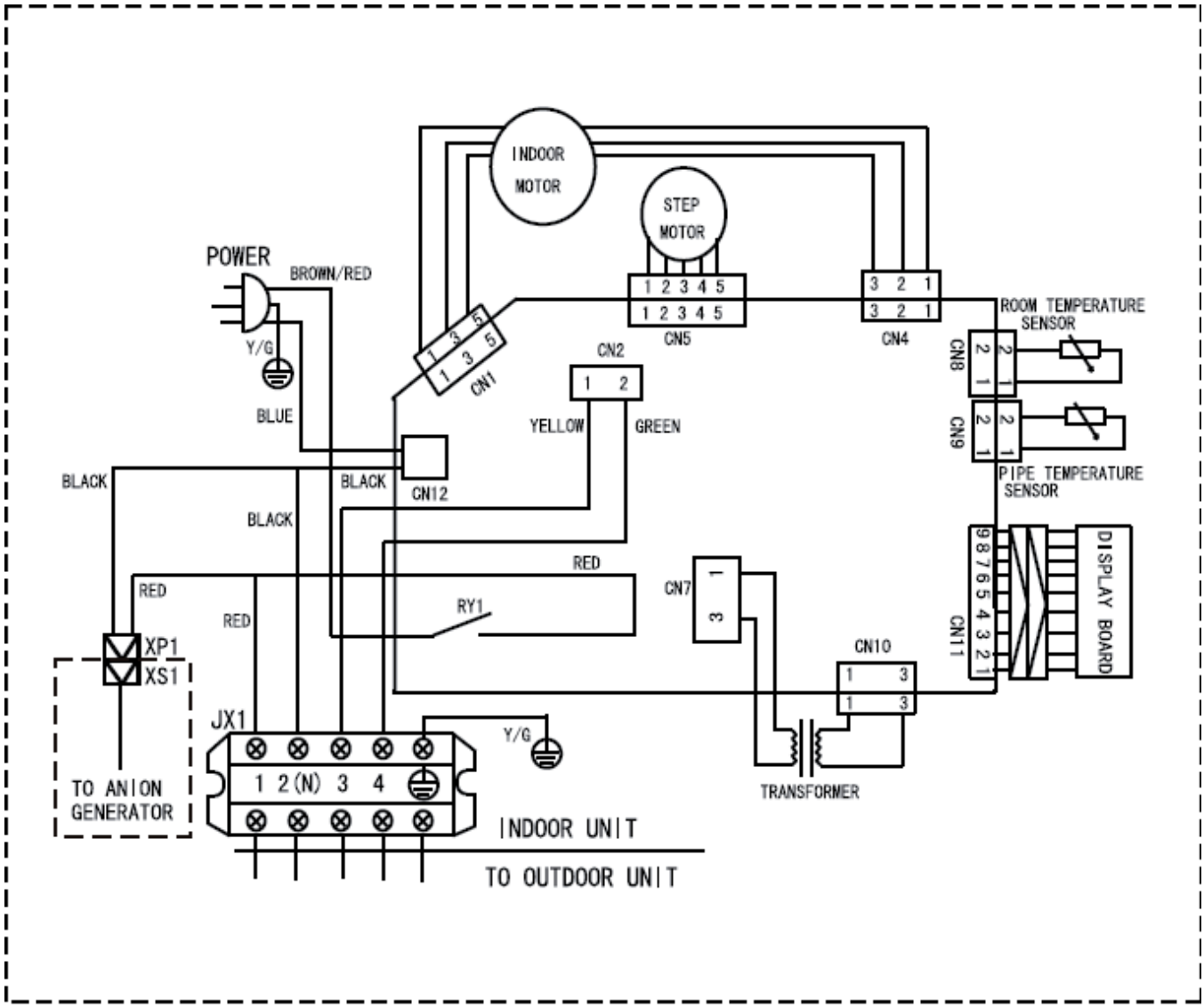


Outdoor unit air temp.℃ DB

Note : The chart is the result from the continuous operation under constant air temperature conditions. However, excludes the initial pull-down stage.

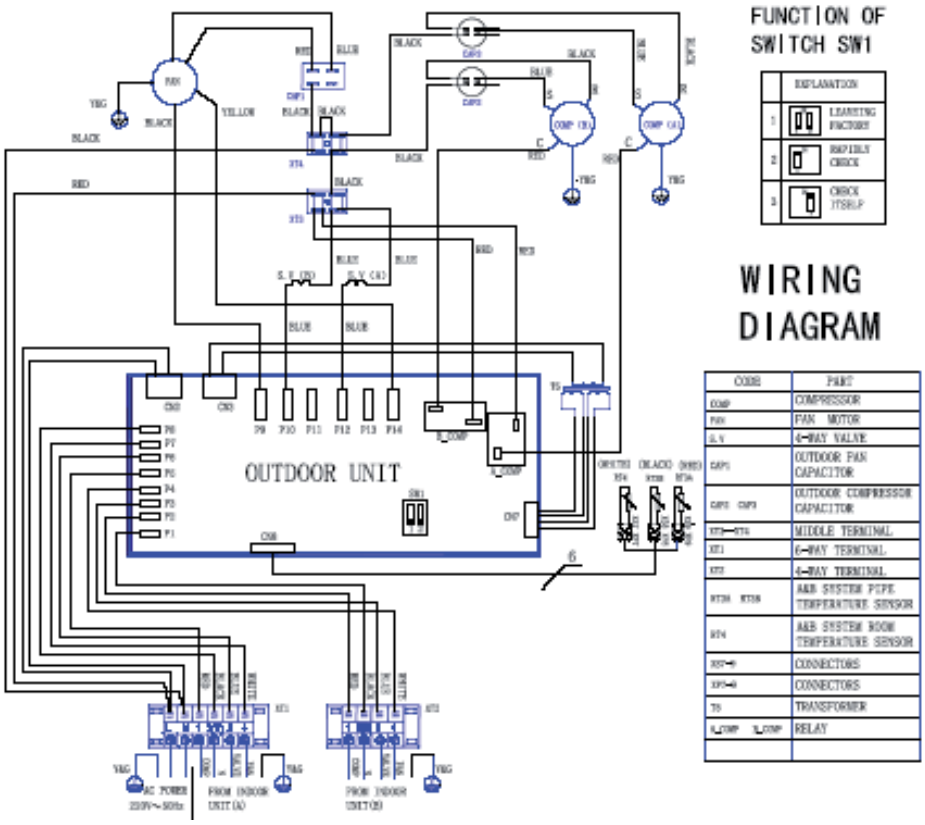
6.Wiring diagram

Indoor unit（9k/12k）



Glory indoor unit

Outdoor unit



For 1 drive 2 outdoor unit(18/21k)

7.Troubleshooting

7.1 Indoor unit

Failure phenomenon	Operation lamp	Timer lamp
Indoor fan speed has been out of control for over 1 minute	☆	X
Indoor room temp. sensor or evaporator temp. sensor is open circuit or short circuit	☆	on
EEPROM error	on	☆
Over current protection of the compressor occurs 4 times in 1h	X	☆

✕ Extinguish

☆ Flash at 5Hz

On Light

7.2 Outdoor unit

Failure phenomenon	LED1	LED2	LED3
Stand by	☆	☆	☆
High temp. protect of condenser		☆	☆
Temp. sensor in condenser 1 is open circuit or short circuit	☆		
Temp. sensor in condenser 2 is open circuit or short circuit		☆	

☆ Flash at 2Hz

8 Electronic functions

8.1 Electric Control working environment

8.1.1 Input voltage: 165~253V

8.1.2 Input power frequency: 50Hz/60Hz

8.1.3 Ambient temperature: -7°C~+43°C

8.1.4 Indoor fan normal working amp is less than 1A,

8.1.5 Outdoors fan. Normal working amp is less than 1A

8.1.6 Four-way valve normal working amp is less than 0.5A.

8.1.7 Swing motor: DC12V.

8.2 Proper symbols and their meanings

TA: Indoor ambient temperature

TE: Indoor evaporator temperature

TS: Setting temperature through the remote controller

TE1: Anti-cold wind, from Fan Off to Breeze temperature

TE2: Anti-cold wind, from Breeze to Setting Fan Speed temperature

TE3: Anti-cold wind, from Setting Fan Speed to Breeze temperature

TE4: Anti-cold wind, from Breeze to Fan Off temperature

TE5: Evaporator low temperature protection entering temperature

TE6: Evaporator low temperature protection restoring temperature

TE7: Evaporator high temperature protection, compressor off temperature

TE8: Evaporator high temperature protection, fan off temperature

TE9: Evaporator high temperature protection, restoring temperature

T3: Outdoor unit pipe sensor

T4: Outdoor temperature sensor

8.3 Systematic functions.

Remote receiving.

Testing and forced run.

Position set for indoor unit wind vane.

LED displaying and alarm.

On or off Timer.

Protection for the compressor.

High temperature protection of indoor heat exchanger in heating mode.

Auto defrosting and heating recovery under heating mode.

Anti cold air under heating mode.

Anti frozen under cooling mode.

8.5 Protection

8.5.1 The compressor functions protection with a delay of three minutes.

8.5.2 High temp. protection of condenser.

8.5.3 Sensor protection at open circuit and breaking disconnection

8.5.4 Temperature Fuse break protection

8.5.5 Fan Speed is out of control. When Indoor Fan Speed is too high(higher than High Fan+300RPM)or too low(lower than 400RPM), the entire unit stops and LED displays failure information and can't returns to normal operation automatically.

8.6 Fan-only mode

Fan speed is high/mid/low/ Auto

8.7 Cooling mode

The 4-way valve is closed under cooling mode.

The action of the compressor and the outdoor fan:

	Condition	Compressor	Outdoor fan
Temp. up	TA> Ts+1	On	On
	TA<Ts+1	Off	Off
Temp. down	TA> Ts	On	On
	TA<Ts	Off	Off

TA: Indoor ambient temperature

TS: Setting temperature through the remote controller

Auto fan under cooling mode:

	Condition T=Indoor Temp.-Setting Temp.	Indoor fan speed
Temp. up	T<3℃	Low
	3℃<T<5℃	Med.
	T>5℃	High
Temp. down	T> 3℃	High
	1℃<T<3℃	Med.
	T<1℃	Low

Anti-freezing control to indoor evaporator under cooling mode

	Condition		Compressor	Outdoor fan
	Temp.	Time		
Temp. up	T> TE6		On	On
	T< TE6	>5 Minutes	Off	Off
Temp. down	T> TE5		On	On
	T< TE5	>5 Minutes	Off	Off

Condenser high-temperature protection under heating mode

T3 >65℃, turn off compressor.

TE5: Evaporator low temperature protection entering temperature

TE6: Evaporator low temperature protection restoring temperature

8.8 Dehumidifying mode

8.8.1 The 4-way valve is off in dehumidifying mode

8.8.2 Compressor and Indoor Fan actions in dehumidifying mode

Compressor run 5 minutes , and indoor fan run 5 minutes in low speed, then turn off the

compressor, indoor fan run 5 minutes in low speed. And repeat on and off cycle.

8.8.3 Low room temperature protection:
When room temperature decreases to below 10℃, the compressor and the outdoor fan will stop(indoor fan is Breeze). Dehumidifying operation will be resumed when room temperature restores to over 13℃.

8.8.4 Under dehumidifying mode, the anti-freezing function of the indoor heat exchanger is the same as that of cooling mode.

8.9 Heating mode

8.9.1 Generally, the 4-way valve is open in heating mode, but it is closed in defrosting mode. 4-way valve must delay 2 minutes compared with compressor if the compressor changed into non-heating mode or turned off. 4-way valve doesn't delay in dehumidifying mode.

8.9.2 Generally, the outdoor fan is turned off with the on-off action of compressor in heating mode, except for the defrosting mode or the end of defrost.

8.9.3 Action conditions of compressor under heating mode: compressor must run for 7 minutes after starting and then judge temperature. Meanwhile other protections are still valid.

	Condition	Compressor	Outdoor fan
Room temp. up	TA> Ts+3	Off	Off
	TA<Ts+3	On	On
Room temp. down	TA< Ts+2	On	On
	TA>Ts+2	Off	Off

TA: Indoor ambient temperature
TS: Setting temperature through the remote controller

8.9.4 Indoor Fan actions under heating mode
Indoor Fan can be set at HIGH/MID/LOW/AUTO by using a remote controller, but Anti-cold wind function has the priority.
Anti-cold wind control function under heating mode

	Condition TE	Indoor fan speed
Indoor exchanger temp. up	TE<TE1	Off
	TE1<TE<TE2	Breeze
	TE>TE2	Setting fan speed
Indoor exchanger temp. down	TE> TE3	Setting fan speed
	TE3<TE<TE4	Breeze
	TE<TE4	Off

TE: Indoor evaporator temperature
TE1: Anti-cold wind, from Fan Off to Breeze temperature
TE2: Anti-cold wind, from Breeze to Setting Fan Speed temperature
TE3: Anti-cold wind, from Setting Fan Speed to Breeze temperature
TE4: Anti-cold wind, from Breeze to Fan Off temperature

8.9.5 Auto wind under heating mode

	Condition T=Indoor Temp.-Setting Temp.	Indoor fan speed
Room temp. up	T<2℃	High
	T>2℃	Med.
Room temp. down	T> 0℃	Med.
	T<0℃	High

8.9.6 Indoor evaporator high-temperature protection under heating mode

	Condition	Compressor	Outdoor fan
Indoor exchanger temp. up	TE<TE8	On	On
	TE8<TE<TE7	On	Off
	TE>TE7	Off	Off
Indoor exchanger temp. down	TE>TE9	Off	Off
	TE<TE9	On	On

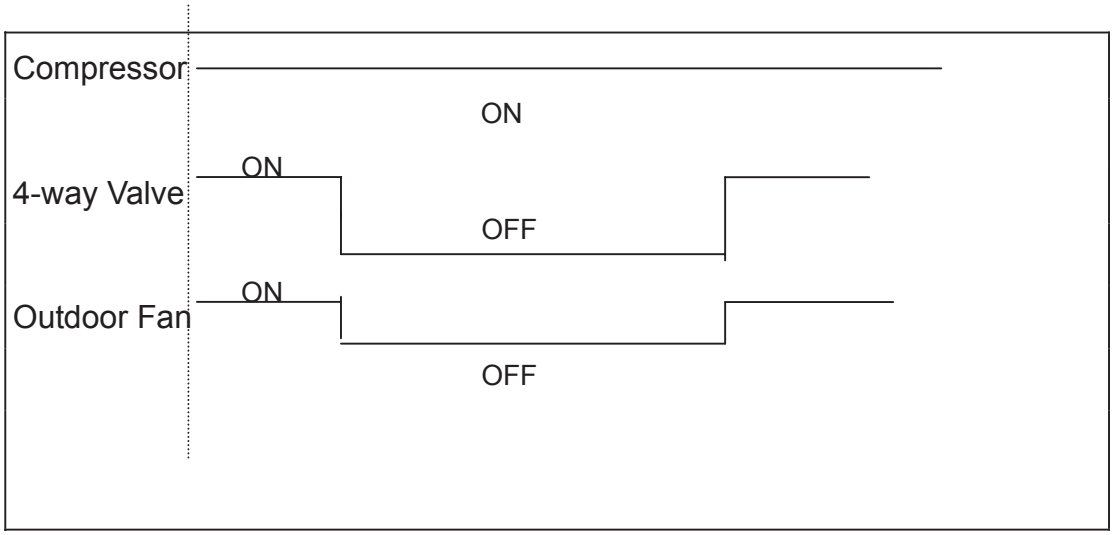
TE: Indoor evaporator temperature
TE7: Evaporator high temperature protection, compressor off temperature
TE8: Evaporator high temperature protection, fan off temperature
TE9: Evaporator high temperature protection, restoring temperature

8.10 Defrosting operation (Available for heating only).

8.10.1 Defrosting condition:
When T3<0℃ and compressor runs 40 minutes.
T3: Temp. of condenser.

8.10.2 Ending condition of defrost
If one of following conditions is satisfied, end the defrost and turn into heating:
A.The defrost time has reached to 10 minutes.
B.T3>20. ℃

8.10.3 Time sequence of the whole defrosting procedure is as follows



8.11 Automatic operation mode

8.11.1 The air conditioner automatically selects one of the following operation modes: cooling, heating or ventilation according to the difference between room temp. (TA) and set temp. (TS).

TA—TS	Operation mode
TA—TS>2℃	Cooling
-1℃≤TA—TS≤+2℃	Fan-only
TA—TS<-1℃	Heating (Fan-only for cooling only type)

8.11.2 The indoor fan blows automatically in corresponding selected mode.

8.11.3 The motion of indoor fan's vane should accord with the selected operation mode.

8.11.4 One mode should be carried out for at least 15 minutes once selected. If the compressor cannot start for 15 minutes, reselect the operation mode according to the room temp. and set temp.or reselect when the set temp. varies.

8.12 Forced cooling function

8.12.1 Select forced cooling function with the forced cooling button or the switch.

8.12.2 The compressor is unconditionally turned on, after 30 minutes cooling operation whose fan mode is set as low, the A/C operates under the DRY mode with a set temp. of 24℃.

8.12.3 All protections of remote control cooling are available under forced cooling operation.

8.13 Forced Auto function

Select forced auto function with the forced auto button or the switch in the display board.

In forced auto status the A/C operates under remote control mode with a set temp. of 24℃.

8.14 Timer Function Requirement

The maximum length of timer is 24 hours and the minimum resolving power is 15 minutes.

8.15 Economic Running

8.15.1 The economic running function is available under cooling, heating or auto mode.

8.15.2 Cooling:

The set temperature rise 1℃ per hour. Two hours later, the set temperature will maintain as a constant and the air circulation is kept at low speed.

8.15.3 Heating:

The set temperature decrease 1℃ per hour. Two hours later, the set temperature will maintain as a constant and the air circulation is kept at low speed (Cold air proof function takes precedence over all).

8.15.4 Auto:

The economic running function operates in accordance with the selected running mode by the auto mode.

8.16 Outdoor fan motor

Outdoor fan motor has only one speed, it acts like this: when any indoor unit send fan start signal and no mode conflict, outdoor fan starts. When mode conflict happens, only indoor unit with 4-way valve start indoor unit gain fan speed.

Evaporator high temperature protection in heating mode: regardless A or B system sends fan motor off requirement, outdoor fan must response.

When shut down, outdoor fan delays to stop by 30 seconds.

T4: Outdoor temp.

	T4	Outdoor fan motor
Cooling mode	T4>27℃	High speed
	T4<25℃	Low speed
Heating mode	T4>13℃	Low speed
	T4<11℃	High speed

8.17 Models and Parameters (Indoor unit)

Model	DS-9U2M_DOS-18U2M	DS-9U11M_DS-12U11M _DOS-21U11M
HSPEEDH	1180	1250
HSPEEDM	1080	1100
HSPEEDL	1000	950
HSPEEDS		
CSPEEDH	1180	1250
CSPEEDM	1080	1100
CSPEEDL	1000	950
CSPEEDS		
TE1	28	28
TE2	32	32
TE3	30	30
TE4	20	20
TE5	2	2
TE6	7	7
TE7	60	60
TE8	53	53
TE9	50	50

10. Characteristic of temp. sensor

Temp.℃	Resistance KΩ	Temp.℃	Resistance KΩ	Temp.℃	Resistance KΩ
-10	62.2756	17	14.6181	44	4.3874
-9	58.7079	18	13.918	45	4.2126
-8	56.3694	19	13.2631	46	4.0459
-7	52.2438	20	12.6431	47	3.8867
-6	49.3161	21	12.0561	48	3.7348
-5	46.5725	22	11.5	49	3.5896
-4	44	23	10.9731	50	3.451
-3	41.5878	24	10.4736	51	3.3185
-2	39.8239	25	10	52	3.1918
-1	37.1988	26	9.5507	53	3.0707
0	35.2024	27	9.1245	54	2.959
1	33.3269	28	8.7198	55	2.8442
2	31.5635	29	8.3357	56	2.7382
3	29.9058	30	7.9708	57	2.6368
4	28.3459	31	7.6241	58	2.5397
5	26.8778	32	7.2946	59	2.4468
6	25.4954	33	6.9814	60	2.3577
7	24.1932	34	6.6835	61	2.2725
8	22.5662	35	6.4002	62	2.1907
9	21.8094	36	6.1306	63	2.1124
10	20.7184	37	5.8736	64	2.0373
11	19.6891	38	5.6296	65	1.9653
12	18.7177	39	5.3969	66	1.8963
13	17.8005	40	5.1752	67	1.830
14	16.9341	41	4.9639	68	1.7665
15	16.1156	42	4.7625	69	1.7055
16	15.3418	43	4.5705	70	1.6469